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ABSTRACT

The literature on the relationships between changes in mood and the menstrual cycle reveals many inconsistencies due to the absence of certain control procedures. Daily self-reports of moods and physical symptoms were collected from women with normal cycles, women using oral contraceptives, and men for 35 days in a camouflaged study. Retrospective reports were made after menstruation became a salient feature of the study. Daily reports revealed no differences in mood across menstrual cycle phases, while retrospective reports resulted in stereotypical premenstrual and menstrual negative effect. Findings are consistent with recent reports of stereotypic responding in menstrual cycle research. (Author)

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DAILY AND RETROSPECTIVE MOOD AND PHYSICAL SYMPTOM SELF-REPORTS AND THEIR RELATIONSHIP TO THE MENSTRUAL CYCLE

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Abstract

The literature on the relationship between changes in mood and the menstrual cycle reveals many inconsistencies due to the absence of certain control procedures. Daily self-reports of mood and physical symptoms were collected from eight women with normal cycles, ten women using oral contraceptives, and ten men for 35 days in a camouflaged study. Retrospective reports were then made after menstruation became a salient feature of the study. The daily reports revealed no differences in mood across menstrual cycle phases while the retrospective reports resulted in stereotypic premenstrual and menstrual negative affect. These findings are consistent with recent reports of stereotypic responding in menstrual cycle research.

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Menstruation has been associated by both the lay public and the scientific community with behavior change and especially with fluctuations in mood. The question as to whether women experience fluctuations in mood that are related to their menstrual cycle is an old one, and has been the subject of many scientific studies. Nevertheless, a comprehensive review of the literature reveals many inconsistent, even contradictory findings.

Perhaps the first systematic study of the extent of a relationship between affect and the phases of the menstrual cycle was done by Benedek and Rubenstein (1939) who concluded that the hormonal fluctuations that characterized the cycle are closely related to the shifts in mood that women experience, that is, negative moods are experienced when ovarian hormones are low (premenstrually and menstrually).

Probably the most powerful study showing the physiological influences on moods during the menstrual cycle was conducted by Paige (1971). She found not only that women experienced negative affect premenstrually, but that women who used oral contraceptives (and therefore who did not experience normal hormonal fluctuations) did not display changes in affect across their cycles. Very recently, similar findings were reported in a longitudinal study by Rossi and Rossi (1977).

The majority of published studies have indicated a relationship between negative affect and the premenstrual phases of the cycle (Altman, Knowles & Bull, 1941; Golub, 1976; Ivey & Bardwick, 1968; Janowsky, Berens & Davis, 1973; Luschen & Pierce, 1972; Moos, Kopell, Melges, Yalom, Lunde, Clayton & Hamburg, 1969; Patkai, Johannson & Post, 1974; Rossi & Rossi, 1977), but others have reported failures to find the expected cyclic changes (Little & Zahn, 1974; Persky, 1974; Wilcoxon, Schrader & Sherif, 1976; Zimmerman & Parlee, 1973). Further questions have been raised by studies reporting stereotypic reactions to the menstrual cycle (Brooks, Ruble & Clark, 1977; Koeske & Koeske, 1975; May, 1976; Parlee, 1974; Ruble, 1977).

Inconsistencies in the literature on the menstrual cycle can be attributed to a number of deficiencies in the research published to date. Some criticisms have been outlined in reviews (May, 1976; Parlee, 1973; Sommer, 1972), but no published study has simultaneously included some very important control procedures. Various studies have failed to: (a) camouflage the purpose of the study, (b) use an objective measure of mood, (c) collect daily reports of mood for a long period of time, (d) use a physiological measure to determine the phases of the menstrual cycle (ovulation), and, (e) use men's changes in mood to make baseline comparisons.

The present research was designed to control for the above factors. To assess whether changes in mood are related to hormonal changes, women who used oral contraceptives were compared with women who were also sexually active but who used other forms of contraception. The study, then, was a replication of Paige's (1971) major research procedure. It differed, however, in that the present work used basal body temperature as an index of ovulation to estimate menstrual cycle phase while Paige had no such physiological determination. A further improvement was that subjects made daily assessments of both physiological symptoms related to the menstrual cycle and self-reports of mood for 35 consecutive days. Other important alterations from Paige's procedure as well as other published research were the inclusion of men in order to allow for comparison, and the assessment of changes in mood for each individual subject across phases of the cycle in addition to the usual procedure of computing group averages and noting how they differed as a function of the phases of the cycle. Lastly, to control for stereotypic responding, the purpose

of the study was camouflaged. The subjects were told that it was a study of "body awareness and mood." The presence of men in the study coupled with daily readings of weight, pulse, and temperature reduced the likelihood that subjects would infer that the menstrual cycle was of interest.

The results of the present study are pertinent to a number of questions. When the purpose of the study is camouflaged and when daily ratings are collected, can it be demonstrated that women who experience normal cycles display rhythmic fluctuations in mood? If women experience such changes, are they any more extreme than those reported by men? Do women who use oral contraceptives (who do not experience the normal hormonal changes) report any rhythmic changes in mood across their cycles?

From the results of earlier work (e.g., Benedek & Rubenstein, 1939; Ivey & Bardwick, 1968; Moos et al., 1969) it was hypothesized that women who experienced normal cycles would display rhythmic changes in mood, with negative affect greatest at the premenstrual phase of their menstrual cycles. In concordance with Paige's (1971) and Rossi and Rossi's (1977) findings, it was expected that women who used oral contraceptives would not demonstrate such mood cycling.

Another goal was to compare daily self-reports of moods and physical symptoms with reports of menstrual experience made retrospectively. The accuracy of the retrospective reports, which specifically requested information regarding menstrual experience, was checked by comparing them with daily reports made when menstruation had not been brought to the attention of the subjects. This comparison, of two types of reports made by the same subjects, was related to evidence of stereotypic responding in research on the menstrual cycle. It also reflected on the attitudes toward menstruation held by women and men.

Method

The subjects were 28 undergraduate students who were selected from a group of volunteers who expressed interest in participating in a longitudinal study of Body awareness and mood. All were sexually active, healthy adults. There were eight women with normal cycles, ten women who used oral contraceptives and ten men. All subjects measured their oral basal body temperature and pulse before arising in the morning for 35 consecutive days. They also recorded their weight daily. The temperatures were graphed for each subject as a function of menstrual cycle day. The approximate day of ovulation was estimated for the women with normal cycles according to the procedure outlined by Hartman (1962). The day of the cycle for the oral contraceptive women was determined from the record of menstrual flow. Men were assigned (for statistical purposes) hypothetical menstrual cycle days by matching them with a female subject. One half of the men were matched with women with oral contraceptive cycles and the other half with women with normal cycles.

All subjects completed the Multiple Affect Adjective Check List and the Menstrual Distress Questionnaire (which was labeled a "Body Awareness Questionnaire") every night before going to bed. On both checklists, the subjects checked each mood and symptom experienced in the past 24 hours. The completed questionnaires and physiological measures were returned to the experimenter every school day.

On the last day of the study, the subjects completed a post-experiment evaluation. The subjects also assessed their (or their partner's) typical menstrual, premenstrual, and intermenstrual moods and physical symptoms using the mood and symptom checklists as they were used throughout the study.

Results

Retrospective Group Analyses

To assess whether there were phase differences in the moods reported retrospectively by the three groups, the Multiple Affect Adjective Check Lists for each subject for each phase (premenstrual, menstrual, intermenstrual) were scored for Anxiety, Depression, and Hostility. The number of checked physical symptoms in each of the eight factors of the Menstrual Distress Questionnaire also was totaled for all subjects for each cycle phase. It was found that three factors (Autonomic Reaction, Concentration, and Control) were rarely checked by subjects and, therefore these factors were not considered further.

In Figure 1, the mean retrospective scale scores are presented as a function of menstrual cycle phase and group. Here it can be seen that all three groups had higher Anxiety, Depression, Hostility, Pain, and Negative Affect scores at the premenstrual and menstrual phases as compared to the intermenstruum. A mixed analysis of variance (groups by repeated measures) was computed for each scale. The phase effect was significant in each case (Anxiety: $F(2,50) = 7.28$, $p < .01$; Depression: $F(2,50) = 14.35$, $p < .001$; Hostility: $F(2,50) = 6.26$, $p < .01$; Pain: $F(2,50) = 6.67$, $p < .01$; Negative Affect: $F(2,50) = 10.88$, $p < .001$), while the group differences were not significant. On all of these scales, scores during the intermenstrual phase were reliably different from those during the premenstrual and menstrual phases.

The Water Retention reports differed from the other measures in that the scores at the menstrual phase of the cycle were larger than those at the intermenstruum, while premenstrual water retention scores were higher than those at menstruation. An analysis of variance on these data also indicated a significant phase effect ($F(2,50) = 10.57$, $p < .001$). The premenstrual water retention scores were reliably different from the intermenstrual scores, but the menstrual scores were not significantly different from those of the intermenstruum.

The Arousal factor was the only measure of positive experience and all three groups reported greater arousal at the intermenstrual phase than at the premenstrual and menstrual phases. An analysis of variance revealed significant phase differences ($F(2,50) = 2.18$, $p < .05$) and a significant group by phase interaction ($F(4,50) = 19.61$, $p < .001$). The intermenstrual arousal scores were reliably different from the premenstrual and menstrual scores. In addition, the intermenstrual reports of the men were reliably different from their reports of menstrual and premenstrual experiences.

The behavioral change factor again demonstrated greater scores at the premenstrual-menstrual phases than at the intermenstruum for all three groups. The men's assessments of their partner's experience indicated a greater number of reported changes in behavior at the premenstrual and menstrual phases than did the self-reports made by both groups of women. An analysis of variance resulted in significant phase differences ($F(2,50) = 3.19$, $p < .05$) and significant group differences ($F(3,50) = 4.38$, $p < .01$). The behavioral change scores at menstruation were reliably different from those reported for the intermenstruum. The men's behavioral change scores were reliably different from those of the women.

Daily Group Analyses

To assess whether moods and physical symptoms fluctuated as a function of the phase of the menstrual cycle, the scores for each of the check list scales for cycle days equivalent to Days 1-3 (menstruation), Days 9-11 (preovulation), Days 14-16

(ovulation), and Days 26-28 (premenstruation) were used in the statistical analyses.

The mean scale scores across cycle phases and experimental groups are exhibited in Table 1. The mean mood scale scores for the women with normal cycles, the women who used oral contraceptives, and the men are nearly equivalent and show little change as a function of cycle phase.

The tests for group differences were performed with $F(2,25)$ at the .05 level. No group differences were found on the mood scales and a single group difference in Water Retention was found for the symptom scales ($F(2,25) = 5.87$, $p < .01$). Water Retention was also the single source of phase differences among the mood and physical symptom scales ($F(3,75) = 2.97$, $p < .05$). The greatest reported water retention was at the premenstrual phase. Finally, a single group by phase interaction effect was found for concentration ($F(6,75) = 4.90$, $p < .001$). The women experiencing normal cycles reported the most difficulty concentrating at the ovulatory phases of their cycles. The women who used oral contraceptives had the greatest difficulty concentrating at the premenstrual phase. No other symptoms and no mood scales demonstrated group differences in pattern of responses across phases.

Daily Individual Analyses

To check that the failure to find significant phase differences in affect was not an artifact of the grouping process, the mood scale scores for each subject were considered as a function of her individual menstrual cycle phases. Of the normally cycling women only two showed changes in scale scores approximating the classic case of high negative affect premenstrually and at menstruation accompanied by lower scores at ovulation. There also was a woman taking oral contraceptives who manifested this classic pattern. In a check of the stability of the oral contraceptive women's scores, it was found that some showed little variation across experimental days, while others' scores were highly variable. The men's scores also demonstrated a wide range of scale scores in all the moods measured. Five of the men's scores were consistent across the experimental days while the other five fluctuated greatly.

Discussion

The daily self-reports provided no evidence that women experience characteristic fluctuations in mood across the menstrual cycle. The hypotheses were not supported. The moods of women with normal cycles did not differ from those of women who used oral contraceptives or from those of men. There were no phase differences in moods across the menstrual cycle for any group. All of the subjects experienced changes in mood, although there were individual differences in the extent and patterning of the changes in affect.

It was found that the water retention scores of women with normal cycles were highest premenstrually with the scores from the menstrual phase greater than those of the other two phases. The women who used oral contraceptives had their highest reports of water retention premenstrually as well. The men's reports were stable across the experimental days and were lower than those of the women.

The only other phase difference from the daily reports was in concentration. Contrary to predictions, women with normal cycles reported greater difficulty concentrating at ovulation than at other phases, while the women who used oral contraceptives had their greatest difficulty concentrating premenstrually.

Inspection of each individual's fluctuations in scale scores revealed that only three women even slightly approximated the classic shift in mood (negative mood

menstrually and premenstrually). One of these women was using oral contraceptives. There was no evidence that the women who used oral contraceptives experienced more stable patterns of mood across their cycles than did the women with normal cycles or the men. In each group there were individuals with few changes in mood during the study and those who displayed larger shifts in mood.

The absence of the predicted pattern of changes in mood in women with normal cycles and the presence of stereotypic patterns of mood in some women who used oral contraceptives are contrary to findings of early work in this area (Altman et al., 1941; Benedek & Rubenstein, 1939; Ivey & Bardwick, 1968; Moos et al., 1969). More importantly, the present results contradict the more recent findings of Paige (1971) and Rossi and Rossi (1977) who concluded that the hormonal patterning of women with normal cycles appeared to be related directly to fluctuations in mood because the women who used oral contraceptives showed no such affective changes.

The present findings are, however, consistent with several other studies. Gottschalk et al. (1962) did not find any uniformity of fluctuations in mood among five women. Other researchers (Little & Zahn, 1974; Patkai et al., 1974; Persky, 1974; Silbergeld et al., 1971; Sommer, 1973; Wilcoxon et al., 1976; Zimmerman & Parlee, 1973) have reported failures to find negative affect premenstrually and menstrually.

In contrast with the daily accounts, the reports made retrospectively by the subjects displayed large differences across cycle phases in their own moods, or in the moods of their sexual partners, using the same adjective checklist. One half of the women reported that they normally experienced greater anxiety, depression, and hostility premenstrually and at menstruation although only three of the 18 women had reported this type of change across cycle phases during the day-to-day evaluations. There were significant phase differences in all three measures of negative affect reported by all three groups.

Differences between the premenstrual-mentrual and intermenstrual phases also were found in five of the eight Menstrual Distress Questionnaire factors. All three groups reported retrospectively that they or their partners experienced significantly more pain, water retention, and negative affect at the premenstrual-menstrual phases of their cycles. The men also reported that their partners displayed behavior changes at the premenstruum and at menstruation. Arousal was the only positive factor on the Menstrual Distress Questionnaire, and the subjects again responded stereotypically. For all three groups, arousal scores were higher at the intermenstrual phase.

The finding that mood cyclicity was manifested only when the menstrual cycle was salient to the subjects lends substantial support to recent reports of stereotypic responding in studies of the menstrual cycle (Brooks et al., 1977; Koeske & Koeske, 1975; Parlee, 1974; Ruble, 1977). Previous researchers, however, related their findings to the use of self-report data and the problems inherent in their use. From the present results, it would appear that self-reports do not necessarily result in stereotypic responding. Instead, the results suggested that the mere mention of menstruation can elicit such responses, and that the lack of camouflaging techniques should be the major criticism of earlier work.

Another important implication is highlighted by the information gathered regarding the emotional fluctuation of men and their attitudes toward menstruation. The men's self-reports of moods revealed that they also experienced affective fluctuations. The moods reported by the men covered the same range and were not more

predictable, unpredictable, stable, nor unstable than those of the women.

The men's reports of the changes in mood of their respective partners were especially interesting. Obviously, the partners themselves were not asked for this information to verify the reports made by the men, but it was surprising to find that nine of the ten men reported negative moods premenstrually, and behavioral changes premenstrually and at menstruation for their partners. It is important to note the stereotypes this would indicate men have of changes in mood across the menstrual cycle, and the problems these attitudes could create for women. It should be recalled that these men were not asked to report the moods of "just any woman" or a "stereotypic woman" but of the women whom they knew best, their wife or sexual partner. The results are even more poignant in that light.

In conclusion, no evidence for cyclic changes in mood during the menstrual cycle was obtained when daily self-reports were collected, the purpose of the study was camouflaged, and a physiological index of ovulation was used. Instead, stereotypic fluctuations in mood were reported retrospectively. The present findings are consistent with reports on the impact of stereotypic responding in menstrual cycle research, and suggest that self-reports are not problematic, but that subject awareness of the purpose of the earlier studies should be criticized.

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Table 1

Mean MAACL and MDQ Scale Scores for all Three Groups Across Menstrual Cycle Phases (PM = premenstrual, M = menstrual, PO = preovulatory O = ovulatory).

Scale	Group: Normal Women				Oral Contraceptive Women				Men			
	PM	M	PO	O	PM	M	PO	O	PM	M	PO	O
MAACL												
Anxiety	8.54	8.21	8.37	8.08	6.50	7.40	8.76	7.30	8.76	8.43	8.03	8.20
Depression	18.83	15.33	18.71	18.79	14.70	16.40	16.40	16.13	18.23	17.56	16.57	17.20
Hostility	12.67	10.92	11.42	11.58	9.81	10.30	11.00	11.17	12.27	11.60	12.03	12.26
MDQ												
Pain	.83	1.45	.79	1.08	1.67	1.30	1.36	1.33	.73	1.03	1.16	.56
Concentration	.37	.33	.71	1.08	.63	1.00	.78	.63	.63	.36	.20	.43
Behavioral Change	.62	.29	.58	.33	.57	.57	.66	.73	.60	.60	.33	.33
Autonomic Reaction	.04	.13	.13	.21	.03	.10	.07	.07	.17	.03	.07	.10
Water Retention	.96	.62	.25	.58	.50	.33	.36	.26	.23	.00	.00	.07
Negative Affect	1.08	1.41	1.21	1.50	1.10	1.27	1.53	1.43	.66	.86	.76	.70
Arousal	1.12	1.66	1.25	.83	1.83	1.66	1.30	1.60	1.23	1.20	1.10	.97
Control	.17	.25	.21	.25	.10	.17	.13	.13	.10	.07	.07	.13

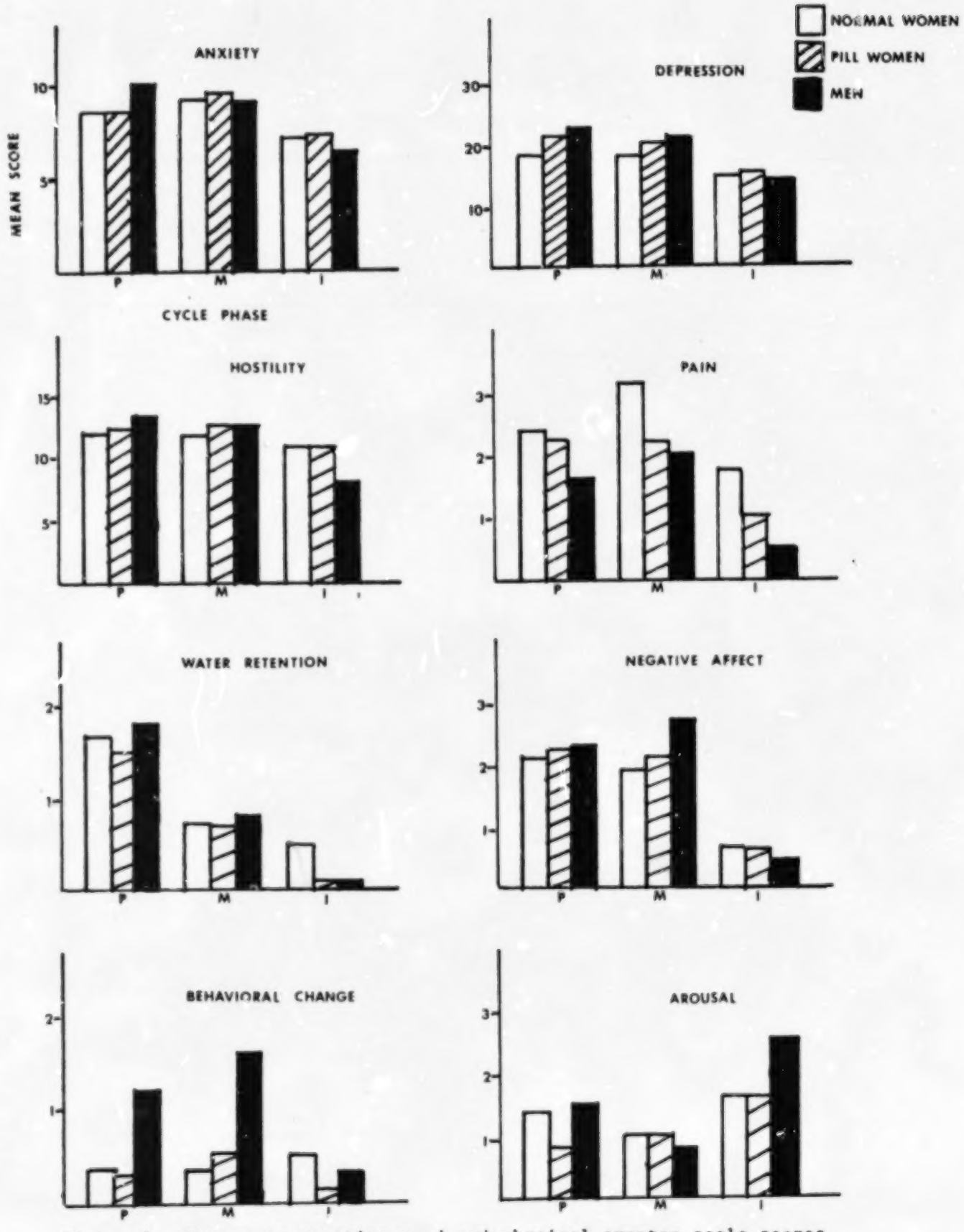

Figure 1. Mean retrospective mood and physical symptom scale scores across menstrual cycle phases (P=premenstrual, M=menstrual, I=intermenstrual) for three experimental groups.